XC-142A

MONTHLY PROGRESS REPORT

VOLUME NO. 44

CONTRACT NO. AF33(657)-7088

LTV LING-TEMCO-VOUGHT, INC.

(1) XC-142A

VTOL TRANSPORT PROGRAM.

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(9) MONTHLY PROGRESS REPORT. no. 44

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AUG[redacted]65,

LTV VOUGHT AERONAUTICS DIVISION

(11) Aug 65,

(12) 20 p.

W. J. Hesse

(10) W. J. Hesse,
~~Vice President-Program Director,~~
~~V/STOL Programs~~

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INTRODUCTION

This report has been prepared in accordance with the requirements of Item 7 of the Contract Number AF33(657)-7868 and is the forty-fourth in a series of monthly reports covering activity on the XC-142A VTOL Transport Aircraft Program.

This report is devoted specifically to a summary of progress for the month of August 1965.

XC-142A #3 Aircraft Taking Off From Dallas For Delivery to EAFB 6 August 1965

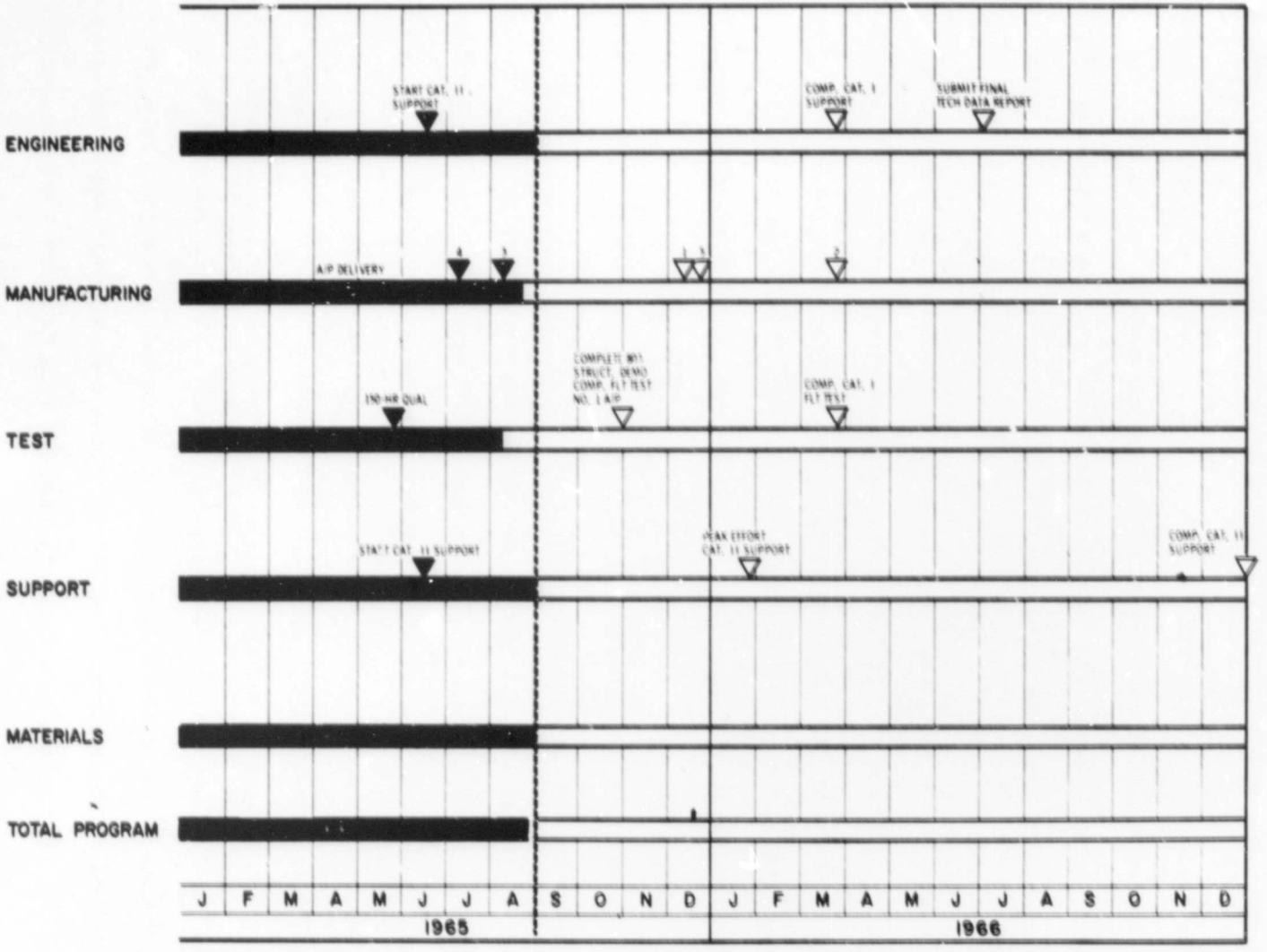
SUMMARY

Another main checkpoint was accomplished during the reporting period with the delivery of the second XC-142A (No. 3 aircraft) to Edwards Air Force Base for operational suitability testing. The aircraft was accepted at the Contractor's facility on 6 August and then flown to Edwards Air Force Base after a stop at Tucson, Arizona. The total flight time during delivery was four hours. As the result of the necessity for inspection, instrumentation installation, weight and balance checks and other required work, this aircraft did not attain flight status during the remainder of the month. However, the No. 4 aircraft, which was delivered to Edwards Air Force Base in July, was in flight status the major portion of the reporting period, accomplishing a total of 15 flights and 18:24 flight time. In addition to work involved with handling qualities, air speed calibration, familiarization, etc., these flights included the first night flight on the XC-142A, encompassing STOL takeoffs, ILS STOL landings, hovers with and without landing lights and cruise at 10,000 feet.

Category I flight testing was conducted entirely on the No. 1 aircraft in August, accomplishing six flights and 4:16 flight time. Two occurrences prevented the aircraft from achieving a higher flight rate during the month. During preparation for flight on 12 August, loose bolts were found in the No. 2 IGC cross-shaft housing necessitating a layup for incorporation of a fix; in addition, on 19 August, a shaft failure on the No. 2 aircraft during ground runs was experienced, resulting in further layup of the No. 1 aircraft. Aircraft No. 2 remained in layup status throughout the month for incorporation of mandatory design changes and repairs. At the end of the reporting period, the first four aircraft had accumulated a total of 161 flights and 123:38 flight time for both Category I and Category II flight test programs. Aircraft No. 5 remained in the final assembly area during August with first flight and delivery anticipated in December.

V/S²TOL - XC-142A LTV AEROSPACE CORP.

PROGRAM STATUS



ITEM 1.A DEVELOPMENT OF XC-142A AND FABRICATION OF FIVE PROTOTYPE MODELS

With delivery of aircraft Nos. 3 and 4 to Edwards Air Force Base having been accomplished and aircraft Nos. 1 and 2 essentially in flight status at the Contractor's facility, the No. 5 aircraft remains the last article to be completed under this item of the contract. At the end of August, the No. 5 aircraft was in the final assembly line undergoing completion of fabrication and installation effort leading toward first flight and delivery in December 1965.

ITEM 1.B FABRICATION OF STATIC TEST ARTICLE (COMPLETE)

ITEM 2 FABRICATION OF MOCKUP (COMPLETE)

ITEM 3 GROUND TEST PROGRAM

3.1 STRUCTURAL TESTS - Complete

3.2 TRANSMISSION SYSTEM TESTS - Complete with the exception of finalization and submittal of the Propulsion Integrated Test Stand test report. Submittal is anticipated in September 1965.

3.3 SYSTEMS TESTS

With the exception of such components or systems as angle of attack, nacelle anti-icing, heat and ventilating system and several control system components, all qualification testing is complete. A report outlining the status of the angle of attack system development and the Contractor's recommendations concerning further develcpment was prepared during the month for submission to ASD in September. Tests of the heating system, the anti-icing system and remaining control system components as well as several development tests were in process as follows:

3.3.1 Engine Nacelle Inlet Duct Anti-Icing System

The program consists of tests to determine criteria for design of an ejector compatible with the air flows and pressures of the inlet duct and the actual tests of the ejector itself.

Pilots of No. 3 Aircraft Preparing For Delivery 6 August 1965

3-3-2 Aircraft Heating System Tests

Purpose is to determine the revisions required to provide a properly functioning heat and ventilating system for the crew and cargo compartments.

3-3-3 Main Transfer Valve Dual Thrust Bearings

Purpose of program is to develop a valve with a secondary surface to improve reliability against seizure.

3-3-4 Main Propeller Actuator Feedback Swivel

Program consists of endurance and lift tests of an improved swivel with the ultimate intent of removing the seizure indicators from the swivel.

3-3-5 Wing Flap Actuator External No-Back Devices

Purpose is to test an external no-back device to determine feasibility of augmenting the existing integral devices in the flap actuators.

ITEM 4 ENGINEERING DATA

4.1 ACCOMPLISHMENTS

During August, the engineering effort continued to be primarily devoted to support of the flight test program, as well as to fabrication of the No. 5 aircraft. Studies and tests continued relative to the resolution of the significant program problems as summarized in paragraph 4.2. Weight of the aircraft at the close of the reporting period was 2606 pounds over guarantee.

4.2 PROBLEM AREAS

4.2.1 Static Thrust Deficiency

Propeller whirl tests continued at Wright-Patterson Air Force Base during August as part of the established program to improve static thrust of the XC-142A propeller. As mentioned in the July progress report, tests of the existing XC-142A propeller, the C-119 propeller and a 16-1/2' diameter propeller with the test facility walls installed were completed. Whirl tests with the walls removed were initiated

XC-142A No. 3 and C-130 Chase Plane Preparing for Flight to EAFB 6 August 1965

on 20 August and are continuing. At the close of the reporting period tests of the existing propeller had been completed and tests of the 16-1/2' propeller with the square tip were in progress. Following tests of the square tip propeller blades the test plan calls for tests of rounded tip blades and finally tests of blades with tips cut-off. Indications from tests to date indicate the propeller blade tip configuration appears to be the prime source of the propeller deficiency. Best estimate for completion of whirl testing is late September 1965.

In additon to whirl tests, wind tunnel tests of the existing full scale main propeller to determine isolated cruise performance were completed at NASA Ames on 26 August. Data from these tests have not yet been analyzed.

4.2.2 Directional Control and Recirculation in Ground Effect

The program to determine the cause and action required to correct the directional disturbance encountered in ground effect at wing angles between 35 and 80 degrees continued during August. The program involves analysis, wind tunnel testing and flight testing. Wind tunnel tests at NASA Langley were completed on 4 August and data were being analyzed with completion anticipated in mid-September. Flight tests in ground effects at wing angles down to 70° are expected to be conducted in September to evaluate the directional effects in this configuration and to obtain data. Information available to date indicates that flap programming changes and increases in differential propeller pitch control will improve directional control in ground effects.

4.2.3 Longitudinal Stability

Action to correct the longitudinal stability problem defined in the July monthly progress report continued during August by redesign of the UHT leading edge. A report outlining the longitudinal stability problem and the planned corrective action (UHT leading edge redesign) was forwarded to ASD in early August.

Engineering releases were completed in late August. A briefing to Edwards Air Force Base of the problem and the corrective action will be held in early September.

4.2.4 Reduced Cruise Performance

Based on flight test data, the XC-142A cruise range, maximum speed and climb performance are lower than calculated. The reduced performance is considered to be primarily due to a reduction in the installed propeller cruise efficiency. A report of the subject summarizing the results of studies to date, objectives of the investigation, and an outline of the program being followed to correct the deficiency was forwarded to ASD on 31 August 1965. Portions of the program are closely associated with the propeller static thrust improvements program (See paragraph 4.2.1) and data from the NASA Ames full scale propeller tests are being analyzed as part of the cruise performance investigation.

ITEM 5 DESIGN DATA

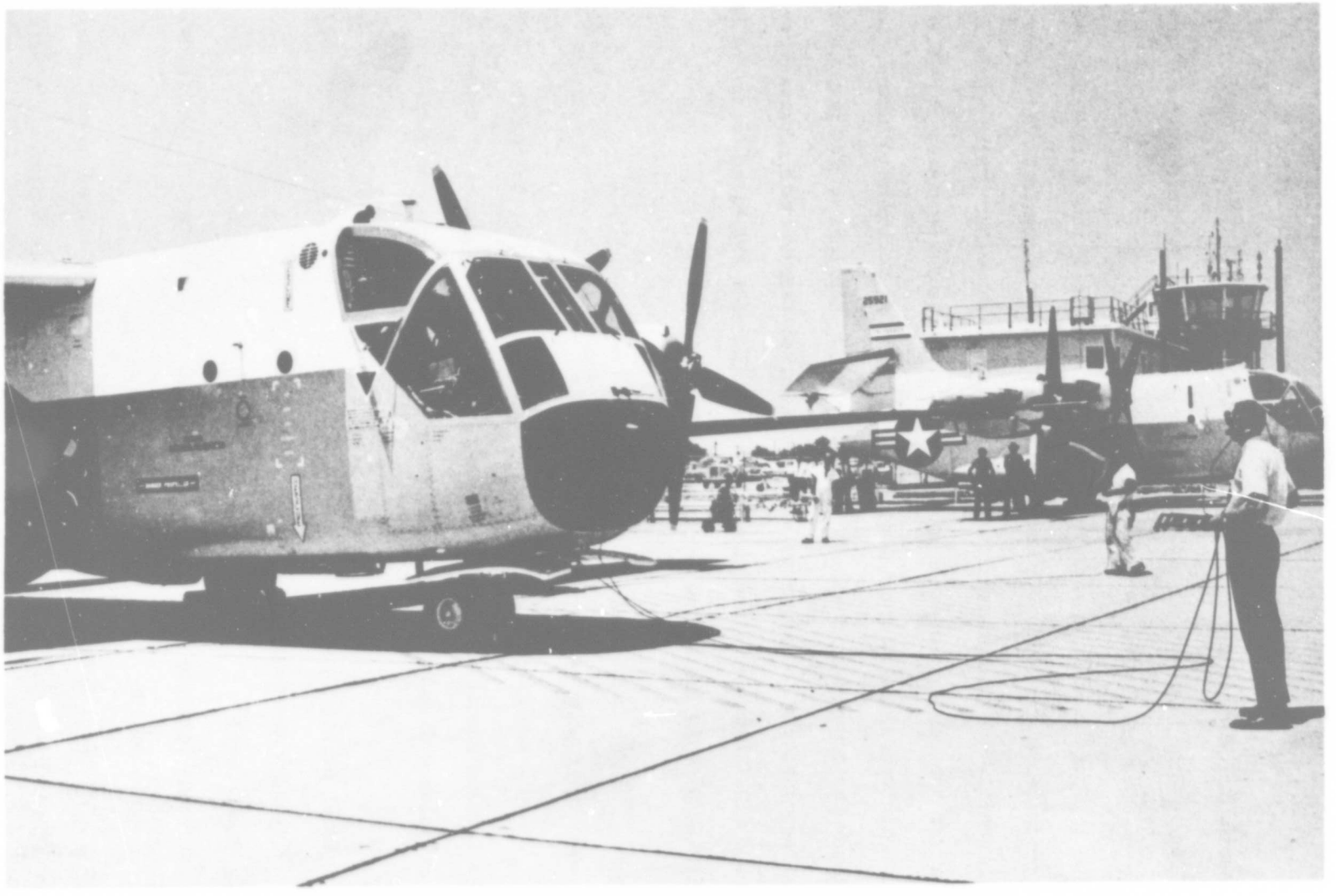
5.1 STATUS OF TECHNICAL DATA

The design data effort during August continued to be centered around preparation and submittal of the remaining test reports. Status of design data and surveillance data at the close of the reporting period was as follows:

	Design Data	Surveillance	Total
Total Submissions to Date	211	236	447
Total Submissions to Go	8	12	20
Grand Total	219	248	467
Percent Complete	95%	95%	95%

5.2 SCN STATUS

As of 31 August, a total of 241 specification change notices against contract reports were submitted to ASD. Of these, 198 were approved, 19 were disapproved and 24 were pending.



XC-142A Aircraft No's. 1 & 3 On Flight Line August 1965

ITEM 6 FLIGHT TEST

Six flights were conducted utilizing the No. 1 aircraft during the month of August as shown below.

Flight Number	Date	Time
43	8/3	0:28
44	8/4	1:18
45	8/10	0:37
46	8/11	0:13
47	8/25	0:55
48	8/25	0:45

These flights added 4 hours and 16 minutes to the flight time bringing the total flight time on the No. 1 aircraft to 36 hours and 30 minutes. Flying was curtailed on this aircraft by the discovery of several loose bolts in the cross-shaft decouple housing on the No. 2 IGC, and by indications of the left-hand shaft bearings being angled outboard. At the close of the reporting period, the aircraft was down for investigation of the latter problem.

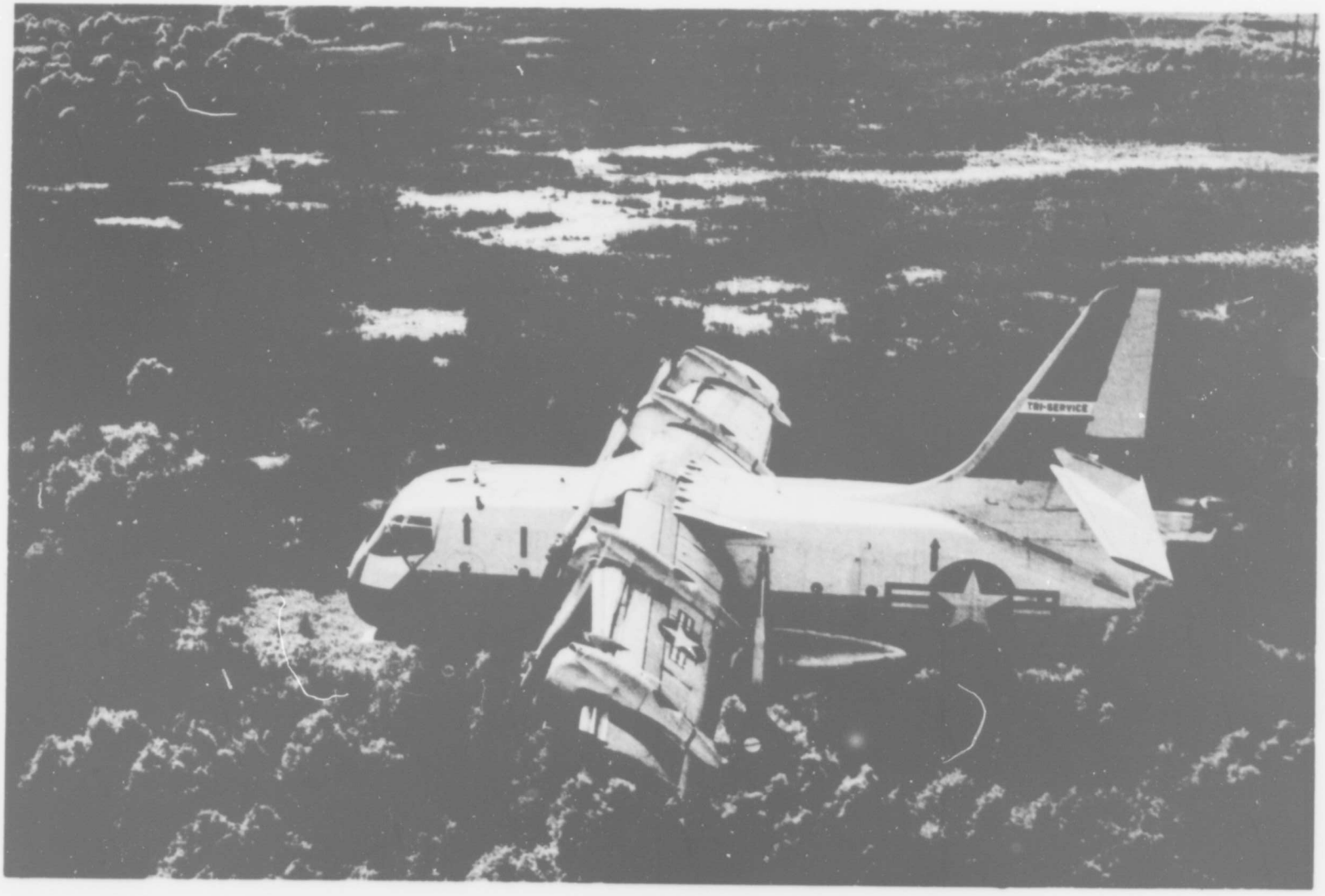
The No. 2 aircraft was scheduled to return to flight status the latter part of August; however, as the result of a wing shaft curvic coupling failure the return to flight status is now predicted to be early in September. The curvic coupling failure was traced to the use of an incorrect curvic nut on the No. 2 aircraft.

The No. 3 aircraft completed its pre-delivery shakedown with one additional flight during this reporting period.

First Number	Date	Time
50	8/3	0:22

The flight brought the total flight time on No. 3 aircraft to 33 hours and 6 minutes.

The aircraft was ferried to Edwards Air Force Base, California, by military pilots on 6 August with one stop at Davis Monthan Air Force Base, Arizona. Total ferry time was four hours.



XC-142A No. 1 Aircraft in STOL Approach

Through 31 August, four XC-142A aircraft have flown a total of 144 flights for a total flight time of 101 hours and 14 minutes during Category I tests at Dallas, Texas. These figures include the pre-delivery shakedown on the No. 3 and No. 4 aircraft but do not include the ferry flights to Edwards Air Force Base, California.

Significant accomplishments during the period were as follows:

- Delivery of No. 3 aircraft to Edwards Air Force Base
- Evaluation of three disk brakes with an anti-skid system.

As the result of the problems encountered on both aircraft No. 1 and 2, progress for the month was less than projected and resulted in an overall flight test program status of approximately four weeks behind schedule.

ITEM 7 REPORTS

The Technical Progress Report for the months of June and July were submitted to ASD on 10 and 24 August respectively and the Financial Report for July was submitted on 20 August.

ITEM 8 SPARE PARTS FOR FIVE PROTOTYPE AIRPLANES

Spare parts status at the end of the reporting period was as follows:

879 total line items scheduled for shipment to bonded warehouse (increase of 33 since last report)

276 total line items scheduled for direct shipment to vendor for overhaul

1155 Total line items on order to date

ITEM 9 DEVELOPMENT AND FABRICATION OF AGE

The status of AGE development and fabrication at the end of August was as follows:

Through August	Submitted	Approved	Demonstrated
CFE AGERD	164	118	110
GFE AGERD	64	43	32
TOTAL	228	161	142

ITEM 10 SPARE PARTS FOR AGE - No activity during August

ITEM 11 TRAINING AND TRAINING EQUIPMENT - No activity during the month

ITEM 12 CONTRACTOR SUPPORT OF FLIGHT TEST PROGRAM

At the end of the reporting period, two XC-142A aircraft were at Edwards Air Force Base for operational suitability testing. The No. 3 aircraft was ferried to Edwards Air Force Base from the Contractor's facility on 6 August. Upon arrival, the aircraft was placed in a layup status for inspection, installation of instrumentation, weight and balance checks and other required items. Consequently, no flights were conducted on this aircraft at Edwards Air Force Base during the month. Status at the end of August was as follows:

EAFB Flt.	Date	Time	Crew
1	8/6	2:30	Chubboy/Larsen
2	8/6	1:30	Chubboy/Larsen

The No. 4 aircraft accomplished nine flights at Edwards Air Force Base during August, accumulating a total of 9:30 flight time.

EAFB Flt.	Date	Time	
7	8/2	1:06	Jones/Larsen
8	8/3	0:36	Chubboy/Larsen
9	8/9	0:54	Rich/Odneal
10	8/10	1:12	Jones/Chubboy
11	8/19	1:18	Chubboy/Larsen
12	8/26	1:12	Odneal/Rich
13	8/27	1:18	Odneal/Rich
14	8/30	0:42	Jones/Neal
15	8/31	1:12	Jones/Odneal

VISITS TO CONTRACTOR FACILITY DURING AUGUST

Date	From	Purpose
20	Chief of Navy Material	Program Briefing
2	FTD, AFSC	Program Briefing
5-6	Edwards AFB	Take delivery of No. 3 aircraft
25-27	ASD, WRAMA	Inspection Requirements Handbook Conference

TRIPS DURING AUGUST

Date	Place	Purpose
9-12	Edwards AFB	Review of Category II Flight Test Supply Program
5	ASD	Review Program Financial Status

ECP INDEX

ECP No.	Title	Status
1	Fuselage, Installation of Aft Fuselage Escape Doors	Disapproved
2	Electrical, Installation of 35 KVA Generators	Disapproved
3	Electronics, Additional AT-256A/ARC UHF Communications Antenna; Installation of	Disapproved
4	Flight Tests, Category I Inflight Load Survey; Elimination of	Authorized
5	Ground Tests, Escape System Sled Tests; Elimination of	Authorized
6	Fuel System, Ferry Fuel Tank; Elimination of	Authorized
7	Escape System, Douglas Escapac 1-C Ejection Seat in Lieu of LW-1 (Modified) Seat; Installation of	Cancelled
8	Furnishings; Cargo, Troop Accessories for Four Airplanes, Elimination of	Authorized
9	Ground Test, Wing Fatigue Test; Elimination of	Authorized
10	Structural Demonstrator Instrumentation, Addition of	Authorized
11	Ground Test, Structural Failing Load Test, Elimination of	Authorized
12	Navigation Equipment, AN/ARC-21C in Lieu of AN/ARN-52 (V); Provisions for	Disapproved
13	Propulsion System, Integral Gearbox Propeller System Test; Reduction of	*
14	Drawing Quality Requirements; Reduction of	*
15	Weight Control Policy; Revision of	Disapproved
16	Main Propeller IGC Bearing Change	Authorized

ECP No.	Title	Status
17	Aluminum Forging Treatment to Improve Corrosion Resistance	Cancelled
18	Redesign Main Propeller Blade; Full Scale Test at NASA-Ames	Authorized
18-1	Redesign Main Propeller Blade; 0.60 Scale Test at NASA-Ames	Authorized
19	Elimination of Engine Nacelle Anti-Icing	Cancelled
20	Deletion of Category I Flight Tests on No. 4 Aircraft	Authorized
21	Cargo Compartment Trim; Elimination of	Disapproved
22	Revision to Engine Throttle Control Mechanism	Authorized
23	Extension of Category I Flight Test Program	Disapproved
24	Retrofit of Power Takeoff Engine Units	Authorized

* No longer identified as ECP.

CCN INDEX

CCN No.	Title	Date
1	Substitute 35 KVA Generator for 25 KVA Generator	12-19-62
2	Reduction in Data Requirements and Engine Designation Change	4-26-63
3	Substitute 25 KVA Generator for 35 KVA Generator	2-04-63
4	Reduction in IGB Propeller Testing	5-03-63
5	Approval of ECPs 4-9	6-05-63
6	Elimination of Structural Failing Load Tests	7-23-63
7	Approval of ECPs 5, 6, 8, 9, 16	7-23-63
8	Additional Electronic Support Equipment	7-19-63
9	Cancellation of CCNs 5 and 7 and Approval of ECPs 5, 6, 8, 9, 16	8-02-63
10	Partial Cancellation of CCN No. 2 and Reinstatement of Reduction in Data Requirements	8-22-63
11	Partial Cancellation of CCN No. 2 and Reinstatement of Engine Designation Change	8-22-63
12	Approval of ECP 18-1	9-30-63
13	Approval of ECPs 4 and 10	11-13-63
14	Approval of ECP 18	11-19-63
15	Approval of Revision to Contract Data Requirements Document	12-05-63
16	Approval of ECP 20	2-19-64
17	Approval of Inspection of Damaged Engine	3-16-64

CCN INDEX

CCN No.	Title	Date
18	Incorporation of Revision A to Detail Spec into Item 1 of Basic Contract	6-04-64
19	Approval of ECP-24	6-15-64
20	Dynamic Analysis of VTOL Thrust Stand	11-9 -64
21	Maintenance of Flight Control Simulator	12-4 -64
22	Revision of Maintenance Manual for Addition of Repair Data	2-15-65
23	Flight and Maintenance Manuals Revision	4- 5-65
24	In-Flight Load Measurement Program	5-10-65
25	Cool Suit Provisions	5-28-65
26	Category II Instrumentation Modification on Aircraft Numbers 1 and 3	6- 7-65
27	Study for Reduction of STOL Landing Distance	6-15-65
28	Improved Braking System	6-15-65
29	Category II Instrumentation Modification on Aircraft Numbers 1 and 3	6-22-65
30	Conditional Acceptance of No. 4 Aircraft	7- 7-65
31	Removal of Parts from Flight Control Simulator	7-26-65
32	Conditional Acceptance of No. 3 Aircraft	7-27-65

LIST OF ABBREVIATIONS

A/C	Aircraft
AGE	Aerospace Ground Equipment
AGERD	Aerospace Ground Equipment Requirements
AMC	Army Materiel Command
APU	Auxiliary Power Unit
ASD	Aeronautical Systems Division
ATC	Air Training Command
CCN	Contract Change Notice
CFE	Contractor Furnished Equipment
CSD	Constant Speed Drive
DIET	Design Information Element Test
EAFB	Edwards Air Force Base
ECP	Engineering Change Proposal
GFE	Government Furnished Equipment
IGC	Integral Gear Case
PERT	Program Evaluation and Review Technique
PITS	Propulsion Integrated Test Stand
QEC	Quick Engine Change
SPO	Systems Program Office
TBO	Time Between Overhauls
UHT	Unit Horizontal Tail
WRAMA	Warner Robbins Air Materiel Area